



# Installation and Troubleshooting Guide



This installation is to be completed by an Authorized Dealer or Professional Service Technician. For questions regarding installation or warranty, call CDI Tech Support at 866-423-4832. Do not return to the Dealer or Distributor where the part was purchased. Contact CDI Electronics Directly for Return Material Authorization.

## CDI P/N: 193-4093

This unit replaces P/N's: 18-5828, 439561, 584093, 585219, and 878768.

**Warning! This product is designed to be installed by a professional marine mechanic. CDI Electronics cannot be held liable for injury or damage resulting from improper installation, abuse, neglect, or misuse of this product.**

**DO NOT USE A MAINTENANCE FREE, AGM, OR DRY CELL BATTERIES AS THE USE OF THESE TYPE BATTERIES WILL VOID THE WARRANTY AND CAUSE DAMAGE TO THE VOLTAGE REGULATOR, ENGINE, AND/OR THE STATOR!**

**NEVER DISCONNECT THE BATTERY WHILE THE ENGINE IS RUNNING AS THIS MAY DAMAGE THE VOLTAGE REGULATOR.**

**If the boat is equipped with a battery switch, make sure that it is a make before break type.**

## INSTALLATION

1. Disconnect the Negative battery cable.
2. Disconnect all wires from the Voltage Regulator.
3. Remove the old Voltage Regulator and thoroughly clean all ground connections and the Voltage Regulator mounting area.
4. Scrape the area around two of the mounting bolt holes so clean metal is showing to ensure the Voltage Regulator case is grounded.
5. If two of the mounting bolts do not have stainless steel star washers, install them on the bolts used in the mounting holes with bare metal showing.
6. Install the new Voltage Regulator using the new gasket.
7. Connect the new Voltage Regulator to the Stator (ignore any stripes on the Stator as the new Voltage Regulator does not require the Yellow wires to be connected to a particular Stator wire).
8. Reconnect the Negative battery cable.

## TROUBLESHOOTING

### BATTERY CHARGING ISSUES:

1. Regardless of whether the charging issue is overcharging or not charging at all, the #1 cause of all charging issues is the battery often due to improper style and/or charging neglect. #2 is the battery's connections. #3 is the Voltage Regulator. #4 is the Stator.
2. The recommended type of battery for outboards is a single (NOT more than one) 850+ CCA dual purpose or cranking/starting **non-maintenance-free battery**.
3. Non-maintenance-free batteries (lead-acid flooded cell; has vent caps on its top) have heavy, thick plates. They're ideal for outboards, where batteries are commonly drained by accessories while fishing, etc. when there is no charge applied to a battery while the battery is in use. Its heavy plates can withstand constant discharging and charging. These batteries have much more reserve time and are much more suited for this behavior.

**NOTE: Some Maintenance free batteries will have vented caps on top. When in doubt, change the battery to a non-maintenance free type.**

4. Maintenance-free batteries should **NEVER** be used in an Outboard application. A new, fully charged maintenance-free battery may work fine at first but their life span is dramatically shortened due to the constant charging and discharging. This activity will cause the cells to become weak, and/or the cells will become dead. When this happens, the battery is unable to accept a full charge, thus putting the Voltage Regulator at extreme risk of failure. Therefore, maintenance-free style batteries commonly cause charging issues shortly after installation.
5. Check all battery connections, particularly at engine ground. Make sure that all connections are tight and free of corrosion. Do **NOT** use wing nuts as they tend to loosen over a period of time from vibration. A loose connection **WILL** cause a premature battery and/or Regulator failure(s).
6. If there is no change, try a single (**NOT** more than one) known good fully charged battery that is 850+ CAA Dual Purpose, or a cranking/starting battery that is non-maintenance free. Make sure the battery is a lead acid flooded cell battery (has vent caps on its top).
7. Measure the DVA across the Stator's Yellow battery charge wires, while connected to the Voltage Regulator. At idle the DVA will normally be between 8-25 DVA. If not, disconnect the Yellow wires from the Voltage Regulator and retest. DVA will normally be 17-50 DVA at idle. If the voltage is low, the Stator is possibly faulty. Perform a visual of the Stator for browning and varnish dripping. These are signs that the Stator has overheated. If the visual inspection shows any of these signs, replace the Stator.

CDI Electronics, LLC • 353 James Record Road SW • Huntsville, AL 35824 USA

Web Support: [www.cdielectronics.com](http://www.cdielectronics.com) • Tech Support: 1-866-423-4832 • Order Parts: 1-800-467-3371

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## BATTERY NOT CHARGING:

1. Clean and service the battery cable connections (both on the engine and on the battery). Stainless hex nuts and lock washers are recommended to connect the cables to the battery.
2. Charge and load test the battery.
3. Check the 25-30 Amp fuse between the Voltage Regulator and the battery (if present). Replace and retest if blown.
4. Check the voltage on the Purple wire while the engine is running, you should see the same voltage as the battery.
5. Verify that the Red wire is connected to 12 VDC from the battery.
6. Remove the flywheel and inspect the heavy battery charge windings for discoloration. If the windings are a dark color, replace the stator. Typical resistance readings of the Stator's battery charging circuit should measure less than 2 Ω.

## TACHOMETER TESTS

1. Measure the DVA across the Stator's Yellow battery charge wires, while connected to the Voltage Regulator. At idle the DVA will normally be between 8-25 DVA. If not, disconnect the Yellow wires from the Voltage Regulator and retest. DVA will normally be 17-50 DVA at idle. If the voltage is now within specification, the Voltage Regulator is likely defective.
2. Check the resistance between the Gray wire from the Voltage Regulator and engine ground. You should read about 10K Ω. Gray to Red, and Gray to the Yellow wires should be a high reading, usually in the M Ω range.
3. Disconnect the Voltage Regulator's Gray wire. At 800-1,000 RPM, check the DVA on the Gray wire FROM THE VOLTAGE REGULATOR measured to engine ground. The reading should be 8 DVA or more. If not, replace the Voltage Regulator.
4. If at least 8 DVA, run a jumper wire from the Gray wire out of the harness to one of the Stator's Yellow wires.
5. If still no tachometer signal, try a known good tachometer.
6. If still no tachometer signal, replace the Stator.

## MAXIMUM OUTPUT TEST:

1. Install an ammeter capable of reading at least 35 Amps between the Red wire and the starter solenoid battery post.
2. Connect a load bank to the battery.
3. In the water or on a Dynamometer, start the engine and bring the RPM up to approximately 4500 RPM in gear.
4. Turn on the load bank switches to increase the battery load to equal 35 Amps.
5. Check the ammeter.
6. If the amperage is low,
  - a) Check the Purple wire for voltage while the engine is running. You should see the same voltage as the battery.
  - b) Connect a jumper wire from the Positive battery cable to the Purple wire and recheck the ammeter. If the amperage is now correct, there is a problem in the harness or key switch.
7. If the amperage is correct, but the battery voltage remains low, replace the battery.

## OVERCHARGING:

1. Clean all battery terminals, cables, and mounting bosses.
2. Check the voltage on the battery with a digital voltmeter and compare it to the dash meter.
3. Compare the voltage at the Voltage Regulator with the voltage at the battery. If the voltage is ok at the Voltage Regulator and not good at the battery, you have a bad connection somewhere. Clean the battery posts and terminals.
4. Replace the battery with a known good Maintenance type flooded wet lead acid marine battery. If the battery voltage remains ok, install a new Maintenance type flooded wet lead acid battery.

## BENCH TEST:

1. Test the Voltage Regulator as follows:

Black Meter Lead	Red Meter Lead	Ohms
Yellow Stator Leads (each)	Red	No Reading (Diode test)
Red	Yellow Stator Leads (each)	Reading (Diode test)
Yellow Stator Leads (each)	Case	High MΩ
Red	Case	High MΩ
Gray	Case	10K Ω
Gray	Red	MΩ
Gray	Yellow	MΩ

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